FINAL REPORT TO THE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION FOR
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NAME AND ADDRESS OF INSTITUTION :

The Regents of the
University of Colorado
Boulder, Colorado 80309

PRINCIPAL INVESTIGATOR :

Thomas R. Ayres
Center for Astrophysics and
Space Astronomy
University of Colorado
Boulder, Colorado 80309-0389
Telephone: (303) 492-4051

T. R. Ayres

Thomas R. Ayres
Principal Investigator

The following is a final report concerning activities under NASA grant NAG5-1534 (ROSAT observing and data analysis).

One project was supported under the grant: a ROSAT observing program "Digging in the Coronal Graveyard".

It involved a ROSAT pointing on the old red giant Arcturus (α Boo: K1 III), a proxy for the future post-Main-Sequence evolution of the Sun. I, T. Fleming, & J. Schmitt obtained a 18.6 ks PSPC observation of the archetype red giant, the deepest such X-ray exposure on any late-type star up to that time. Despite the long integration, we failed to detect any coronal emission from the target: the upper limit on the X-ray surface flux of the old giant is less than 10^{-4} solar. Our observation makes it clear that solar-like hot (millions of degrees) outer atmospheres do not accompany the evolution of solar-mass stars away from the Main Sequence. We published a summary of our work in a recent issue of the Astrophysical Journal Letters: "Digging in the Coronal Graveyard: A ROSAT Observation of the Red Giant Arcturus", T. R. Ayres, T. A. Fleming, & J. H. M. M. Schmitt, ApJ, 376, L45–L48 (1991). A copy of the publication is included with the report.

During the course of the project, I developed specialized image display and processing techniques for the ROSAT data, because at the time the "PROS" system had not yet been released. In addition to the preliminary publication of the results of the program in the Ap. J. (Letters), I also am using the X-ray upper limit for Arcturus in several other papers currently in progress.